Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Transformations of Linear Functions

Transformations of Linear Functions | A1-U05-P18

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for an exact transformed rule, coordinate map, domain, or justified comparison.

8 PDFs and a README; 55 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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Algebra 1

Transformations of Linear Functions

Name: _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

Starting from $f(x) = \frac{7}{6}x - \frac{5}{2}$, shift every output by $\frac{5}{2}$. Write g, and compare its slope and y-intercept with f.

Bank label: _____

The original line contains $(-\frac{1}{3}, \frac{5}{2}), (\frac{8}{3}, -\frac{7}{2})$. Translate coordinates by the map x to $x + \frac{4}{3}$ and y to $y - \frac{5}{6}$. List every image point and verify that the same displacement was used throughout.

x	y
$-\frac{1}{3}$	$\frac{5}{2}$
$\frac{8}{3}$	$-\frac{7}{2}$

Bank label: _____

Starting with $f(x) = 9x - 2$, shift input coordinates right 3, scale all resulting outputs by 0, and finally shift outputs by -5. Compose all three stages in order.

Bank label: _____

For $f(x) = -5x + 8$, analyze the proposed change 'horizontal right 4' without plotting every point. State what happens to parallelism and cite the controlling parameter invariant.

Bank label: _____

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Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Beginning with $f(x) = -8x + 6$, reflect/scale every output by -1 and afterward translate outputs by 0. Expand the whole intermediate function before applying the final shift.

Choose an efficient method, explain why it fits the given representation, and then complete the task exactly. Points $(-6, 4), (9, -6)$ lie on the original line. Apply the axis-scale map x to $-\frac{2}{3}x$, y to y, then list the exact images and describe any reflection or collapse.

x	y
-6	4
9	-6

Choose an efficient method, explain why it fits the given representation, and then complete the task exactly. Apply the input operation $g(x) = f(-x)$ to $f(x) = -\frac{13}{9}x + \frac{17}{5}$. Expand g and state how an original x-coordinate is mapped.

ALPHA: The rules $f(x) = -4x + 7$ and $g(x) = -4x + 12$ are accompanied by this correspondence evidence: point $(2, -1)$ maps to $(2, 4)$. Does the added evidence resolve the otherwise nonunique shift description?

Assume the named family 'hshift' only. Can $f(x) = -4x - 6$ be transformed into $g(x) = -4x + 14$? Recover the parameter if possible, or identify the incompatible feature.

Assume the named family 'xscale' only. Can $f(x) = 5$ be transformed into $g(x) = 5$? Recover the parameter if possible, or identify the incompatible feature.

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Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

Incoming: Yes: input multiplier $a = -\frac{1}{2}$. Substitution in the named transformation reproduces $g(x) = 4x - 3$.

Apply the input operation $g(x) = f(-2x)$ to $f(x) = \frac{5}{3}x - 2$. Expand g and state how an original x-coordinate is mapped.

Your response: _____

Incoming: $g(x) = -\frac{10}{3}x - 2$. Coordinate effect: each original x-coordinate is divided by -2; y is unchanged.

Multiply every output of $f(x) = -\frac{11}{9}x + \frac{13}{4}$ by $\frac{6}{5}$. Expand the entire function and compare both graph parameters.

Your response: _____

Incoming: Scaling all outputs by 0 gives $g(x) = 0$. The entire transformed graph is the x-axis, with slope 0 and y-intercept 0.

Assume the named family 'xscale' only. Can $f(x) = -8x - 3$ be transformed into $g(x) = 4x - 3$? Recover the parameter if possible, or identify the incompatible feature.

Your response: _____

Incoming: The unchanged y-coordinate and x-change identify a horizontal left shift of 3; a vertical shift would keep $x = 0$ and change y.

Map the collinear points $(-3, -8), (0, 1), (4, 13)$ using x to $\frac{3}{2}x - 2$ and y to $-\frac{1}{3}y$. Compute every exact image and use the common affine coordinate rule to verify the transformed line.

x	y
−3	−8
0	1
4	13

Your response: _____

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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

Choose an efficient method, explain why it fits the given representation, and then complete the task exactly. Map the collinear points $(-\frac{9}{2}, \frac{7}{3}), (\frac{3}{2}, -\frac{5}{3})$ using x to $-\frac{2}{3}x + \frac{11}{4}$ and y to $\frac{5}{2}y$. Compute every exact image and use the common affine coordinate rule to verify the transformed line.

x	y
$-\frac{9}{2}$	$\frac{7}{3}$
$\frac{3}{2}$	$-\frac{5}{3}$

Complete the task, then compare the direct graph approach with an equivalent check. Explain why both support the same conclusion. Assume the named family 'hshift' only. Can $f(x) = \frac{7}{5}x + \frac{13}{6}$ be transformed into $g(x) = \frac{7}{5}x - \frac{61}{30}$? Recover the parameter if possible, or identify the incompatible feature.

Transformations of Linear Functions

Full Worked Solutions - excerpt

Worked example

Problem. Starting from $f(x) = \frac{7}{6}x - \frac{5}{2}$, shift every output by $\frac{5}{2}$. Write g, and compare its slope and y-intercept with f.

Answer. $g(x) = \frac{7}{6}x$. The slope remains $\frac{7}{6}$ and the y-intercept changes from $-\frac{5}{2}$ to 0.

Explanation and check.

An output shift adds $\frac{5}{2}$ only to the intercept; it does not change the rate of change.

Worked example

Problem. The original line contains $(-\frac{1}{3}, \frac{5}{2}), (\frac{8}{3}, -\frac{7}{2})$. Translate coordinates by the map x to $x + \frac{4}{3}$ and y to $y - \frac{5}{6}$. List every image point and verify that the same displacement was used throughout.

x	y
$-\frac{1}{3}$	$\frac{5}{2}$
$\frac{8}{3}$	$-\frac{7}{2}$

Answer. Mapped points: $(1, \frac{5}{3}), (4, -\frac{13}{3})$. The same coordinate rule is applied to each point.

Explanation and check.

Add the specified coordinate displacements to each point; the image list is $(1, \frac{5}{3}), (4, -\frac{13}{3})$.